

The Potato News Bulletin

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The Potato Association of America

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THE ELEVENTH ANNUAL MEETING

Without doubt the Eleventh Annual meeting of The Potato Association of America was the best ever held by this organization from the standpoint of attendance and the number and quality of the papers presented.

Most of the principal potato producing states and provinces were well represented. Some of the members who attended the meeting traveled practically across the continent. Anyone deeply interested in the potato industry and living near where the meetings are held should take advantage of the opportunity to attend these meetings. The next annual meeting will be held at Kansas City, Missouri.

In addition to the interesting reports read by the committees, there were twenty-seven papers presented; four on seed improvement, five on the rest period and storage, six on spraying and dusting, the remaining twelve on miscellaneous subjects dealing with potatoes. The papers and most likely the reports will be published in form of the Annual Report as usual. These papers contain the latest information concerning the various phases of the potato industry and much food for thought. Many new and helpful ideas were exchanged in the discussions.

A committee was appointed to select the best paper presented and to forward the same to "The Committee on the Award of the Second American Association for the Advancement of Science Prize". This prize consists of one thousand dollars. The title of the paper selected is, "How to improve yield and quality of seed potatoes by selection and to maintain such improvement," by C. H. Myers, Cornell University, Ithaca, N. Y. It is hoped that Dr. Myers will capture the prize.—**Walter M. Peacock.**

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THE POTATO NEWS BULLETIN

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AT WASHINGTON, D. C.

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HOW TO MAKE THE POTATO NEWS BULLETIN A BETTER PUBLICATION

This publication made remarkable progress last year. However, the editor feels that it is starting on a new era for a still greater improvement. The extent of this improvement depends upon the contributions of its readers. Every reader should feel that The Potato News Bulletin is his paper and its success partly depends upon him. This publication can be made the greatest of its kind ever published if each reader does his part well. The field is large and there is much to be done. You can help by securing new members, sending in contributions in form of articles, reports on the conditions of the crop and other news items, and offering constructive criticisms and suggestions. Every member can do something along these lines.

The editor has felt for some time that considerable could be gained by adding more members to the editorial staff. You will be glad to learn that the following specialists have consented to act as associate editors: Dr. C. O. Appleman, physiologist, University of Maryland, College Park, Md.; Dr. E. V. Hardenburg, horticulturist, Cornell University, Ithaca, N. Y.; Dr. Wm. H. Martin, plant pathologist, New Jersey Agrl. Exp. Station, New Brunswick, N. J.; and Dr. C. H. Myers, plant breeder, Cornell

University, Ithaca, N. Y. You will hear from these men on their various subjects dealing with the potato industry during the year. But these men without your aid cannot make a successful Potato News Bulletin. Therefore, everyone should do his part. — **W. M. P.**

MEMBERSHIP

At the annual meeting a committee was appointed consisting of J. W. Weston, chairman, E. V. Hardenburg, H. O. Werner, Daniel Dean and W. M. Peacock, to consider the advisability of two kinds of membership in The Potato Association of America. This committee recommended two classes of membership, active and associate. The active members are to receive both the Proceedings of the Annual Meeting and The Potato News Bulletin. The active members are to pay \$1.00 membership dues and \$1.00 for the subscription to The Potato News Bulletin per year. The active members will have the privilege of voting at the meetings. The associate members will receive The Potato News Bulletin and pay \$1.00 annually for the subscription of this publication. These recommendations were put in form of a motion and was passed unanimously at the annual meeting.

It is hoped that our present membership will remain as active members. The editor feels sure that most of the present members will want the Proceedings of the Eleventh Annual Meeting held December 29-31, at Washington, D. C.

There is no better time to start a membership drive than now. Show your neighbors the publications of The Potato Association of America and solicit their membership. It is not essential to have a membership application blank. Simply send in the name and address of the new member along with his dues and when these are received at the office a receipt for the same will be forwarded to him. We hope to increase the membership ten fold or more during the year.

The editor and business manager wishes to make the following proposition given below to all prospective members. Become a member of the Potato Association of America, read its publications thoroughly and diligently and at the end of the year should you feel that you have not received your money's worth return the publications in first class condition together with a signed statement and your money will be refunded. — **W. M. P.**

ANNOUNCEMENTS OF MEETINGS

If those who are in charge of the future potato meetings will inform the editor of such meetings announcement of them will be made in the columns of this paper. Our goal is to render as much service as possible to every potato producing state and province. — **W. M. P.**

POTATO MEETINGS AND SHOWS

INDIANA.—The Indiana Potato Show and Potato Conference will be held at Purdue, La Fayette, Ind., Jan. 15-16. Substantial premiums are being offered for the best exhibits of the following varieties: Irish Cobbler, Early Ohio, Rural and Bull Moose. The program is as follows: The place of potatoes in Indiana agriculture, F. C. Gaylord; varieties and sources of seed for profitable production, J. G. Milward; making good seed better by treating, greening and cutting, C. T. Gregory; importance of leafroll and mosaic and their control, M. W. Gardner; four serious potato insects and their control, J. J. Davis; limiting factors in potato yields, Wm. Stuart; and how I grew 500 bushels an acre by Jason Woodman.

MICHIGAN.—The Michigan Potato Show will be held at East Lansing, Mich., Feb. 2-6. Over six hundred dollars are offered as prizes besides silver cups and ribbons. The writer has not seen the program but he feels certain that it will be an interesting one.

PENNSYLVANIA.—The Pennsylvania Potato Growers' Association will hold its annual meeting at Harrisburg, Pa., Jan. 21 and 22. Anyone who is further interested in this meeting should communicate with the secretary-treasurer, Miles Horst, 309 Telegraph Building, Harrisburg, Pa.

SOUTH DAKOTA.—The Annual Potato Show and Growers' Convention of the South Dakota Growers' Association will be held at Watertown, Feb. 24-26.

POTATO NOTES

Colorado.—Greeley has shipped 1646 cars of late potatoes this season. It is estimated that there are about 2000 cars left in the Greeley District. The shipments will not be quite as large as had been expected, owing to the fact that there is considerable hollow heart and growth crack this year. This condition is due to the heavy rains during the month of September. It is believed that 10 to 15 per cent of the crop will be a loss owing to this condition.

The San Luis Valley has shipped 2789 cars and it is estimated that there are 1000 cars left in the valley. The Western Slope has shipped 2507 cars and it is estimated that there are about 1500 cars left.

The Weld County Seed Show will be held January 6th, 7th and 8th. This show is being sponsored by the Greeley Chamber of Commerce, the Weld County Commercial Club, co-operating with the Weld County Extension office. The show will be held in the agricultural rooms of the County Court House. All exhibits must be taken from lots of seed actually offered for sale and each grower

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is requested to state amounts of seed he has for sale. One of the purposes of the Weld County Seed Show is to encourage the production of registered seed. The potato varieties listed are Triumph, Irish Cobbler, Rural, Russet Rural and Pearl. — **W. C. Edmundsen, December 26, 1924.**

Nebraska. — The 8th Annual Convention of the Nebraska Potato Improvement Association on Thursday and Friday, December 4th and 5th. There was a fairly good attendance at the meetings. The following counties had exhibits on display: Box Butte, Kimball, Dawes and Scottsbluff. There was a good exhibit of certified seed. Each exhibitor's seed was displayed in half bushel hampers. The first three mentioned counties are dry land and most of their exhibits consisted of seed, the Triumph being the predominating variety in all exhibits, although some table stock was shown in each.

Scottsbluff county had the largest exhibit. It was composed of potatoes from both the dry and irrigated farms. The following varieties were entered by that county: Triumph, White Triumph, Cobbler, Early Ohio, Russet Burbank, Rural, Russet Rural, Blue Victor and Pearl, 50 exhibits in all.

The Boys and Girls Club Exhibit was especially good. With the exception of two exhibits of Irish Cobblers, their exhibit was

made up entirely of Triumphs.

An educational exhibit of spindle tubers prepared and exhibited by H. O. Werner, was very interesting. Mr. Werner gave a very good talk on spindle tuber. Lantern slides were used in connection with his address. Dr. R. W. Goss gave an illustrated lecture on the common potato diseases of Nebraska. Mr. E. R. Bennett's talk on potato growing in Idaho was also very instructive. — W. C. Edmundson, Dec. 8, 1924.

SEED POTATO CERTIFICATION NOTES

Michigan.—On Tuesday, November 25th, 1924, the Michigan Certified Seed Potato Growers' Association completed its organization by adopting its By-Laws and electing its Board of Directors.

There were twenty-seven charter members signed up at this meeting.

This is the first Co-operative Association organized under Chapter I, Part III, Act. 84, Public Acts of 1921, to sell seed potatoes.

The object of this Association is to sell the seed potatoes of the growers co-operatively.

The purposes of the Association as defined in the Articles of Association are:—

1. To encourage the production of certified seed potatoes following the recommendation of the Michigan Agricultural College Seed Inspection Service.
2. To effect the distribution and sale of the same to the greatest possible advantage through co-operative arrangements with the Michigan Potato Growers' Exchange, Cadillac, Mich.
3. To improve the market quality of the general table crop by encouraging the use of certified seed in Michigan and the employment of the most effective cultural practices.

The membership dues were placed at \$2.00 per member, and is open to any certified seed grower of Michigan or other person interested in the purposes of this Association.

The Annual Meeting will be held at Cadillac on June 15th of each year.

The Board of Directors consists of seven active members and one honorary, elected on a regional basis, six of whom are certified seed growers and one to be chosen from the list of Directors of the Michigan Potato Growers' Exchange. All elected for one year.

The co-operative plan for transacting the business of the Association is as follows:

Every member shall enter into a marketing or sale contract with the Association and shall agree to deliver according to the direction of the association for sale by it through its agent, the Michigan Potato Growers' Exchange, and on account all the certified seed potatoes grown or produced by him or her, except such potatoes as such member shall give away or retain for his own use or sell at retail. (The term retail defined in the seed contract.

Any member failing to comply with this shall pay to the association the same charges as he would have had the Association handled the potatoes and in addition be liable for any loss that his failure to deliver may have cost the Association. The grading of the potatoes to conform to the quality required of certified seed potatoes. The grades being made by the Rules Committee of the Michigan Agricultural College governing the Inspection and Certification work done by that institution, the College furnishing inspection service before or at time of shipment. All brands, labels, trademarks, etc., belonging to the Association to be used at the direction of the Board of Directors and only on such potatoes shipped by members of the Association who are in good standing.

The Board of Directors have authority to establish a pool for such periods as desirable to be settled for on the basis of grade, and with differentials established to take care of the difference in freight rates.

Payment for potatoes will be made to members doing business with the Association on receipt by the Association of the proceeds from the sale of such potatoes, less any advances made on said potatoes by the Association to the members, and the amounts necessary to meet selling charges,—provided the Board of Directors of the Association in its discretion may defer such payments until the close of any pool period.

The advantages of Michigan grown seed potatoes for planting in Michigan and other states has been fairly well demonstrated by the various agencies promoting better Agriculture principally the Extension Department to the various Agricultural Colleges. The number of people who realize the advantage of planting clean seed free from variety mixture is gradually increasing. The market demands are also demanding a standard pack containing only one variety. The natural results of such work is to increase the knowledge of what we have with a resultant increase in the demand for such seed. The Michigan Agricultural College Extension Division and Farm Crops Department are anxious to promote the development of the certified seed potato industry that will serve the farmers purposes to the best advantage.

The Michigan Certified Seed Potato Growers' Association will not in any way interfere or replace the Michigan Potato Producers' Ass'n., an organization that has been in existence since 1914 and that has pioneered the certified seed potato work and will continue to function as in the past. The college will furnish both organiza-

tions with the inspection service and will certify to the accuracy for this work, all at the same cost and all on the same basis of requirements.

The Michigan Certified Seed Potato Growers' Association is a new cooperative association consisting principally of growers of Certified seed potatoes who feel that their best interests as seed growers will be served by such an organization. Application for membership and membership fees may be sent to H. L. Barnum, Sec'y-Treas., Cadillac, Michigan, or to J. W. Weston, Corresponding Secretary, East Lansing, Michigan. — **J. W. Weston, December 15, 1924.**

NOTES ON RECENT LITERATURE

ANONYMOUS. — Third annual potato fair at Vancouver. — *Farm and Home*. — 7: 49., December 4, 1924. — The author states that the extent of the work being done by certified seed growers is a revelation to many. The quality of the exhibit was reported good. Two new varieties, Bonanza and Cowichan Leader, were on display. The former is a seedling and originated by T. H. Bain, at North Vancouver a few years ago. It is said to have disease resistant qualities. The Cowichan Leader has been developed from a selection made by Philip Fremlin, Duncan, Vancouver Island, B. C. It resembles the Reliance more than any other of the well-known varieties.

The annual meeting of the British Columbia Certified Seed Potato Growers' Association was held during the fair. C. Tice, the secretary-treasurer of this association, reported that there were great opportunities for the province of British Columbia to build up a name for seed potatoes and reviewed the purposes of the association. The president, George Stewart, of Keatings, gave a talk on the functions of the Central Association and also spoke of funds for the development of the seed certification work. Several others including Dr. D. Warnock, the Deputy Minister of Agriculture, helped to make an interesting program. — **Walter M. Peacock.**

DURYEE, W. B. — Potato Improvement Campaign. — *Hints to Potato Growers*, 5: No. 7, November, 1924. — The State Improvement Committee with Dr. Martin as chairman began active operations in August. All growers visited in the central counties by the field agent aligned themselves with the better seed movement and as a pledge of good faith agreed to buy and treat some certified seed.

The Monmouth County Farmer's Exchange and several other distributors requested the field agent to instruct their loading agents, in the requirements of U. S. Grade No. 1. Well graded stock of excellent quality advertised in trade papers resulted in better prices and fewer cars rejected at destination.

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This year's Wisconsin crop of certified seed is 50% less than last year. The Wisconsin Certified Seed Potato Co-Operative Association will handle 75% of the 1924 Wisconsin certified seed potato crop. Place your order now if you want WISCONSIN CERTIFIED SEED POTATOES to plant in 1925.

Amos Radcliffe, Pres. and Sales Mgr.
Eagle River, Wisconsin

At conferences of seed potato dealers held at Freehold and Princeton, Dr. Martin gave a thorough analysis of seed producing sections, at the same time discussing the superiority of the southern New Jersey seed from certified sources. As a means of developing public sentiment, a comedy drama representing a public trial of the New Jersey Potato, which is accused of having caused serious loss and of being an undesirable citizen, has been given in several parts of the state. Through the farm publications it has received wide publicity.

The Federation of County Boards is making a study of freight rates on New Jersey potatoes shipped to middle western cities, compared with other growing sections equally distant from them.

The committee hopes to be able to determine the relative standing of New Jersey potatoes and to find out if progress is being made in overcoming the price handicap suffered in past seasons. The matter of financing the potato crop in cooperation with the Agricultural committees of the County Bankers Associations is under consideration. — P. M. Lombard.

GRATZ, L. O. — What are good seed potatoes? — *Southern Ruralist* 31: 18, December 15, 1924. — The author defines good seed potatoes and relates how they are produced in the seed potato-producing states. He gives figures from Maine Agrl. Exp. Sta. Bul. 316 in reference to the loss in yield from spindle-tuber, mosaic

and leafroll. The Florida growers are urged to buy certified seed potatoes. — **Walter M. Peacock.**

MOTTET, S. — The best varieties of potatoes (trans. title). — *La Vie et Rur*, 25: No. 44, pp. 295-299, November 1, 1924.

This is a discussion of the leading varieties of potatoes from different sources which have been grown in France. The author points out that while more than a thousand varieties have appeared during the past century only a comparatively small number of these have survived until the present day. A few are noteworthy with respect to the length of time which they have remained in cultivation, particularly the Chavre, Marjolin and Vitelotte which date back to 1815, also Pousse debout which has been grown since 1847, Chardon and Quarantaine de la Halle since 1851, Blanchard since 1859 and Saucisse since 1867.

Different countries have furnished the following varieties which have given excellent results: Germany, Imperator, Geante Bleue, Professor Wohltmann, Juli; England, Royale, Victor, Fin de siecle, Great Scott; United States, Merveille d'Amerique, Early Rose; Holland, Rood Star, Eigenheimer, Ideal; Austria, Industrie; Poland, Ursus; France, Belle de Fontenay, Saucisse, Rosa, Institute de Beauvais.

Brief notes are given on the varieties which are more or less extensively cultivated in France at the present time. These are grouped according to their uses. — **C. F. Clark.**

NEWMAN, L. J. AND LOWE, G. N. — Potato storage and fumigation experiments. — *Journ. Dept. Agr. Western Australia*, 1 (2nd ser.): No. 3, pp. 367-381. September, 1924.

The authors attribute the failure of locally grown potatoes to keep well in storage to 3 main causes; damage due to the potato moth (*Phthorimaea operculella*), attacks of a fungus (*Fusarium* sp.) and lack of care in digging and handling.

Storage experiments were conducted with the Delaware variety kept at a temperature of 33°, to 44° F. (av. 39°) for a period of 120 days, using tubers freshly dug, those dug 42 days before being placed in cool storage and those which had previously been held in common summer shade storage for 3 months, to test the keeping qualities under cool storage and the effect of cool temperatures on the control of the tuber moth and the fungus. A test was also made of the effectiveness of carbon bisulfid fumigation, prior to storage, for the destruction of the tuber moth.

At the end of the storage period the cooking quality of the lots which had been placed in cool storage immediately and within 42 days after digging, respectively, was found to have deteriorated but little and no sprouting had occurred. Those which had been in common storage 3 months before being placed in cool storage were shrivelled, sprouts had developed and the cooking quality was very poor.

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We also offer Bliss Triumph seed of exceptional vigor, and excellent type yielding with us over 300 bushels per acre, containing less than one per cent total diseases except Mosaic.

No expense is spared in thoroughly roguing our fields, removing as far as humanly possible all plants that show any signs of disease or lacking in vigor. Such plants, both stalks and tubers, are entirely removed from the field by our system of covered receptacles to prevent the passing of aphids and insects from diseased to healthy plants.

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The temperature of the cool storage was found to be very effective in controlling the fusarium fungus. It also killed the tuber moth, all stages having been found destroyed on examination 72 days after the beginning of the cool storage period. This insect was also destroyed by fumigating with carbon bisulfid for 48 hours at the rate of 2 pounds per thousand cubic feet of space. Fumigation, however, is not necessary where cool storage is used. — C. F. Clark.

RAMSAY, J. T. — Results of potato manuring trials. Milbrook, 1923-24. — *Journ. Dept. of Agr., Victoria, Australia*, 22: pt. 8, pp. 508-511, August, 1924. — The use of commercial fertilizers on a rich red volcanic loam soil in central Victoria was found to be profitable, the greatest net gains, however, followed the use of relatively small amounts. The use of lime in addition to the fertilizers appeared in some cases to have a depressing effect on the yield.

Three series of experiments with mature and immature seed, using Carman No. 3, showed an average increase in yield of approximately 60 bushels per acre in favor of the immature seed.

In a comparative test of selected and unselected seed from 4 varieties, the selected seed gave an average increase in yield of 117 bushels per acre, or a percentage gain of 22.8. — C. F. Clark.

SEVEGRAND, P. — The preparation of seed potatoes (trans. title). — *La Vie Agr. et Rur.* 25: No. 44, pp. 289-291. Nov. 1, 1924.

The author considers the production, care and preparation of seed to be factors of great importance in increasing the yield of potatoes. In certain parts of France, particularly the regions of Saint-Malo (Ille-et-Vilaine), Paimpol a Lannion (Cotes-du-Nord), Saint-Pol-de-Leon et Roscoff and Point-l'Abbe, where the production of potatoes has reached a very high degree of perfection, special attention is given to the selection of seed and its subsequent treatment. In other sections, however, there is much to be learned and applied in this respect.

It is recommended that degeneration diseases be eliminated during the growing period as the diseased plants can be more readily detected at that time. Sorting of the seed may be accomplished during the fall and winter, if not done previous to storing, removing the small tubers, those which are irregular in shape and varietal mixtures. The planting of whole seed is advised except in the case of varieties which produce principally large tubers. Germination of tubers before planting is recommended as earlier plants are produced, tubers of weak germination can be detected, the presence of mixture can often be discovered, the yield increased by the greening of the sprouts and more vigorous plants obtained. Directions are given for the methods used in sprouting. — C. F. Clark.

ABSTRACTS OF PAPERS

ABSTRACTS OF PAPERS DELIVERED BEFORE THE POTATO ASSOCIATION OF AMERICA

DECEMBER 29-31, 1924 *

REPORT OF RESEARCH COMMITTEE

Dr. Freeman Weiss, Chairman
U. S. Dept. Agr., Wash., D. C.

In past years it has been customary to summarize all the evidence in regard to research during the previous year. Owing to the advent of the Potato News Bulletin and reviews of such work while in progress the need of that type of report is no longer necessary but as a matter of fact this information is now available when it is of most importance and not allowed to accumulate until the end of the year in a committee report.

Since the Research Committee had to talk about something I decided to talk about what we are going to do rather than what we ought to do. The former seemed more important than the latter. In order to secure more progress throughout the country some time ago the Research Committee sent a letter to all those connected with the potato industry. Necessarily this service could not be complete. It included experiment stations which are carrying on the more important potato work in the middle Western and far Western States. The suggestions made in this letter were:

- (1) Please give outline of potato improvement work engaged in; also work under contemplation.
- (2) Are there any additional potato problems of which present facilities and time do not permit of your taking them up?
- (3) Viewing potato production as a whole what do you regard as of greatest importance?
- (4) Work in hand which is yielding important results; furnish an abstract.
- (5) Credit in full overproduction, not merely stipulate but stipulate all angles of production; large crop with lowest possible price.

HOW TO IMPROVE THE YIELD AND QUILTY OF SEED POTATOES BY SELECTION AND TO MAINTAIN SUCH IMPROVEMENT

C. H. Myers, Professor of Plant Breeding
Cornell University, Ithaca, N. Y.

The discussion is limited almost entirely to the possibility of improving the yield of potatoes by selection, on account of the

* These abstracts were furnished by the authors. Abstracts of the other papers will appear in later issues of this publication.

difficulty of definitely determining quality. Since possibility of success by selection depends upon the frequency and nature of bud mutations which may occur, the writer reviews the evidence which is available concerning this point. The results of his own experiments, extending over a period of ten years, are presented as confirming the conclusion that bud mutation is of considerable importance. The necessity of differentiating between strains and varieties is also stressed, and it is suggested that a sub-division of varieties into their component parts is of great importance to the seed potato grower. To do this, careful methods of making comparative tests are essential, and specific recommendations are made, based upon the author's own experiments, which are in general confirmed by other workers who have studied this problem. The limits of improvement by selection are definitely recognized and pointed out. But in the author's opinion, the success that may be attained is sufficient to justify the general application of the hill unit method, and he suggests that certification standards ought to include points with reference to the ancestry of the stock certified.

HOW CAN BEST STRAINS OF A VARIETY BE LOCATED AND MAINTAINED

**H. R. Talmage, Grower of Seed and Table Stock Potatoes
Riverhead, Long Island, N. Y.**

In the writer's opinion there is no best strain of a variety for all soils and conditions. What is the best strain under one set of conditions is entirely worthless under a different set of conditions.

A single test of many varieties in one locality and for one year would not be a reliable indication of the best strain, even for that locality. It is unwise for the growers in any section to use extensively a strain of potatoes, however well recommended, that has not been grown rather extensively one or more years in that locality.

Because a strain has proven satisfactory in a section one year is not any guarantee that it will be all right the next season. Even though certified, there are some diseases that certification does not cover adequately, at least in some states.

The best way in which to locate strains that are superior is to have them thoroughly tested in field culture by a number of practical farmers and then to have fields of the same strains growing in the North, inspected by some one qualified to know the condition of the growing crop, for the next season's planting.

HOW TO MAINTAIN SUPERIOR STRAINS OF POTATOES

Starting with a strain of superior vigor and reasonably free of the degenerative diseases, the writer believes it is quite possible to maintain that strain up to a practical standard of high quality,

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Perfect Planting Produces Correct Uniform Sizes

No waste of seed on account of doubles

No. 402
Assisted Feed
(Two-man)
PLANTER



No misses and no doubles—Every Seed-piece properly placed and properly spaced

All potato growers admit that for absolute accuracy in planting, nothing equals the **IRON AGE Assisted Feed Potato Planter**,—the 100 per cent Planter. It opens the row, spreads the fertilizer, mixes it with the soil, drops seed at exact distance apart desired, covers and marks out next row—all in one operation.

Spraying is Necessary for Profit

The **IRON AGE High Pressure Traction Sprayers** protect the crop. Have the valuable patented **Pressure Retainer and Pump Relief**.

The IRON AGE Potato Diggers

Traction or Engine Driven, with Patented Automatic Throw-out Clutch, with wide elevators, easy running, get all the Potatoes.

Write for catalogs describing these machines, also Garden Tools and Horse Hoes & Cultivators.

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by the right methods, and under reasonably favorable conditions.

A carefully followed system of selecting and planting by "hill units" gives a maximum opportunity to isolate high yielding strains and keep down the percentage of degenerative diseases. This plan is quite similar to the tuber unit method but works with the hill as a unit. The advantage is that it is possible to get a large amount of seed stock with a much smaller number of plots, or units.

METHODS TO BE OBSERVED TO PREVENT SPREAD OF VIRUS DISEASES IN POTATOES GROWN FOR SEED STOCK

Donald Folsom and E. S. Schultz, Plant Pathologists

The subject is complicated by the existence of ten diseases that vary with the variety of potatoes, with the season, and with the region as to effects and rate of spread. Different kinds of spread are (1) from one region to another, (2) from one farm to another in a region, (3) from one field to another, (4) from one hill to another, and (5) from one part of a tuber or plant to another part. Only the last kind is desirable. For the other kinds, prevention methods that help more or less are importation from certain regions, certification, personal inspection, advance testing of seed stocks, isolation of seed stocks, roguing of tuber-unit seed plots, insect control, and hill selection in combination with insect control. Mild mosaic spreads worse than spindle-tuber in spite of control measures in northeastern Maine, in the Green Mountain variety. Mild mosaic is harder to detect in warmer seasons and regions. Leafroll spreads more farther south, and rugose mosaic is worst furthest south. The problem of spread of virus diseases requires local study for each potato region, preferably in co-operation with standardizing experimenters.

DISEASE AN IMPORTANT FACTOR IN THE TRANSIT AND STORAGE OF POTATOES

**George K. K. Link, Plant Pathologist
Chicago University, Chicago, Ill.**

The subject is discussed under three headings: 1. The nature and types of diseases important in the transit and storage of potatoes. 2. The nature and extent of losses caused by such diseases. 3. The questions of responsibility for these losses.

Diseases of the potato can be grouped into (a) those due to non-living organisms, the so-called diseases of environment, and (b) those due to living organisms, the so-called parasitic diseases. A second arbitrary classification is made into field or production, and transit and storage, or market diseases. The fact that a dis-

ease is active or important commercially as a market disease does not necessarily imply that it did not originate or develop in the field.

It is impossible to estimate in dollars the huge losses due to market diseases of the potato. They are of great significance from the national economic point of view because they involve multifarious indirect and direct waste.

The fixing of responsibility for losses in transit and storage presents a real scientific problem. At present the basis for adjudication is totally inadequate. The commercial and legal groups have no conception of the fundamental biological principles involved in determining the necessary data.

POTATO DUSTING vs. SPRAYING IN VERMONT

**Julian A. Dimock, Seed Potato Grower
East Corinth, Vt.**

50/81
A non-technical paper giving the results of 7 years' use of the copper lime dust on potato fields.

The "versus" part of the paper is left for others to discuss.

Poor water supply, small areas, separated or hilly fields make conditions for which the dust is much better adapted than the wet spray.

Instances are given when dust has not given sufficient control of late blight. The writer believes this to be due to lack of timeliness and thoroughness of application rather than to the dust.

For five of these years the dust has given perfect control, although unsprayed fields in the neighborhood have gone down.

SOIL TYPE AS A FACTOR IN SEED POTATO PRODUCTION

**E. V. Hardenburg, Professor of Vegetable Gardening
Cornell University, Ithaca, N. Y.**

This paper is a preliminary discussion of the role of soil type as it affects both the potato crop itself and the crop resulting when such potatoes are used for seed purposes. The demand for high grade seed potatoes is annually becoming more critical. Although seed potato production on moor and peat soils in Europe and on "tule", peat, and muck soils in this country is not altogether new, the acreage of such soils used for this purpose is increasing as the possibilities and advantages of this practice become better known. Work in Germany and Sweden and in various states of the United States along this line are briefly reviewed.

Experiments designed to study the effects of such soil types as peat, muck, light and medium sandy loams, and medium to heavy clay loams on shape of tuber, tuber-set, time of come-up and ma-

turity, eating and keeping quality, and yield were begun in New York in 1922. The preliminary results to date are reviewed.

Number of tubers set per plant has rather consistently been higher in the lighter soils and this tendency may even be carried over into the succeeding crops from seed so grown. Typical tuber shape as measured by relative width to length is apparently better maintained in light than in heavy soils but each soil type probably has its distinct influence on this factor. Muck-grown seed of both Green Mountain and Irish Cobbler varieties came up earlier than seed from heavier soils. This initial advantage was lost, however, during the growing season. Cooking tests made soon after harvest revealed a consistently higher degree of mealiness and a whiter flesh in the boiled product in the muck-grown tubers than in tubers from other soils. Finally, the tests for yields resulting from seed which was produced on different soil types rather consistently showed a higher yield from muck-grown seed than from seed grown on sandy loam, while sandy loam seed outyielded silt or clay loam seed.

THE EFFECT OF FERTILIZER ON THE NUMBER AND SIZE OF POTATO TUBERS

**John Bushnell, Horticulturist
Ohio Agr. Exp. Sta., Wooster, Ohio**

In a fertilizer experiment on a field where all three of the common fertilizer elements were deficient, the following facts were observed: (1) Nitrate increased the number of tubers per plant. (2) Potash increased the size of tubers. (3) Phosphate further increased size when the deficiency of potash was relieved. Except for this limitation on the action of phosphate, these generalizations held in all cases irrespective of the fertilizer combinations in which the elements were applied.

POTATO OBSERVATIONS ABROAD

**Wm. Stuart, Horticulturist
U. S. Dept. Agr., Wash., D. C.**

The Potato Conference at Edinburgh, August 20 and 21, which was held under the auspices of the Board of Agriculture for Scotland, seedsmen, potato dealers, and growers, was an unqualified success in both attendance and interest taken in the papers read and discussions following them.

Late blight was found to be quite general in the potato fields of England, Scotland, Ireland, Holland and France. No determined effort to control its ravages was noted. Apparently the growers prefer to sustain an occasional heavy loss from late blight rather than to go to the expense of equipping themselves with effective

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Seed Department,

spray machines and making a sufficient number of spray applications to control the spread of the disease.

Seed certification has made rapid strides in Scotland. The registration of new varieties or improved selections, or sports, has apparently met the approval of the Scotch seed potato specialist.

The necessity of replicating plots or rows in comparative yield tests was emphasized by Prof. J. A. Scott Watson, of the University of Edinburgh.

The average per acre yield in Great Britain is approximately twice that of the United States. In the harvesting of the crop, in commercial districts at least, the potatoes are largely picked up by women and children. The customary practice is to pay them a lump sum per acre, usually a pound sterling, or slightly less than \$5.00. Apparently the pickers are not concerned as to whether the crop makes 100 or 200 sacks per acre. The crop is shipped to market in sacks containing an even hundredweight or 112 pounds.

Storage houses, as we know them in this country, do not exist in Great Britain. The crop intended for winter merchandizing is stored in pits or clamps. Losses in the clamps are frequently severe. It is conservatively estimated that the average annual storage loss in Great Britain is approximately 25 per cent.

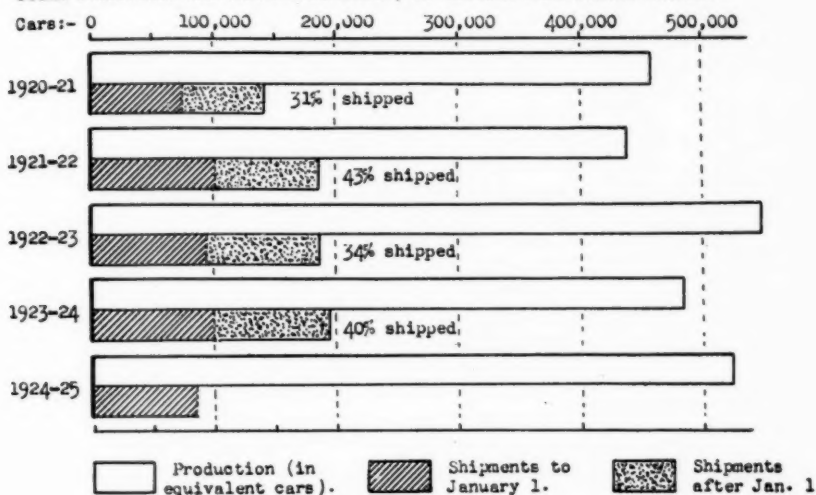
Potato diseases are receiving considerable attention at the Rothamstead Station, Harpenden, England; the State Institute for Phytopathology at Wageningen, Holland, and at the Phytopathological Research Institute in Paris, France. The principal lines of investigation at these three research institutions are the wart disease, late blight, mosaic, stipple streak, verticillium wilt, leafroll, premature tuber formation, fillosite, insect transmission of virus diseases, etc. Some very interesting data on these diseases are soon to be published.

MAIN-CROP MOVEMENT ABOUT HALF COMPLETED (Contribution from the Fruit and Vegetable Division, Bureau of Agricultural Economics, U. S. Department of Agriculture)

Demand and price plainly affect the movement of potatoes from northern states. In the light crop years, 1919, 1921 and 1923, carlot shipments to the end of December from 18 leading late-potato States were 81,285 cars, 101,230 cars and 99,115 cars, respectively. These quantities are from 4,000 to 14,000 more than moved during the succeeding autumn months (1920, 1922 and 1924), when production was much heavier. Total shipments for the entire season from these 18 States have been gradually increasing. In 1919-20 the volume was 122,885 cars, and for succeeding seasons: 140,635 cars, 185,370 cars, 186,035 cars and 193,580 cars. Percentage of the crop shipped in carlots, as reported by the carriers, fluctuates considerably, but has shown a marked increase during recent seasons. Compared with 32 per cent in 1919-20, the next season the

proportion was 31 per cent. But in 1921-22 about 43 per cent was shipped, and from the large crop of 1922 only 34 per cent. Last season the percentage again increased to 40.

TOTAL PRODUCTION AND CARLOT SHIPMENTS, 18 LEADING LATE-POTATO STATES:



By the end of December, 1924, approximately 85,000 cars of potatoes had been shipped from this group of States. Assuming that the usual 50 per cent, or a little more, of the season's total movement was then completed, it would mean that possibly 170,000 cars may be forwarded from the huge 1924 crop. Combined production in these 18 important States is 15,500,000 bushels, or 25,830 carloads, less than in 1922, when the season's output exceeded 186,000 cars.

It is too early as yet to get a good line on the probable potato crop in the South. Preliminary estimates from Florida indicate about 25 per cent less acreage than last year, and it is possible that plantings in other sections will be reduced in view of the heavy carry-over of northern potatoes. Movement of seed to the southern producing districts has been somewhat draggy, according to best reports available. Total production of early potatoes no doubt influences to some extent the price and movement of main-crop supplies in the spring, but the effect is not so direct or so consistent as one might expect. In 1921, when the early States had 21,192,000 bushels, shipments of old potatoes after January 1 filled 63,500 cars. The next spring, with 24,131,000 bushels of new potatoes, movement from the North was 84,140 cars. The most direct relation between these two factors seems to have been in 1923. The short crop of 18,709,000 bushels in the South was met by shipments of 93,065 cars from the 18 leading main-crop States, and in the first

half of 1924 about 94,470 cars of old potatoes moved to market, when the southern production was 28,456,000 bushels.

The usual mid-winter advance in prices occurred during late December. Shipments for the month were around 14,600 cars, or 1,000 more than were marketed during December, 1923, but supplies were rather light at Christmas time. Average price of New York sacked round whites to jobbers in New York City advanced from \$1.10 per 100 pounds on November 29 to \$1.25 on January 3, while northern stock in the Chicago carlot market gained 15 cents, closing at \$1.20. Demand at shipping points also improved, followed by advances of 10 cents to 20 cents per 100 pounds. The f. o. b. price of bulk Maine Green Mountains reached 65 cents. Sacked round whites sold at \$1.00-\$1.05 in western New York and 90 cents 95 cents at north-central points, while Idaho Russetts for California shipment touched \$1.30. These f. o. b. ranges still were about one-third below last January's level, and in Maine the price was not even half of last year's. Efforts were being made to find export outlets for part of Maine's heavy crop. In terminal markets, jobbing prices averaged 25 cents per 100 pounds less than those of a year ago, the difference in the Middle West being only 10 cents and in the East as much as 60 cents.

MISCELLANEOUS PAPERS

ESTIMATED CROP OF CERTIFIED SEED POTATOES IN NORTHEASTERN REGION GAINS 155 PER CENT OVER 1923

V. A. Sanders, Statistician

The Northeastern Certified Seed Potato Region includes Prince Edward Island, New Brunswick, Maine, New Hampshire, Vermont and New York. From current reports of inspection officials, supplemented by many reports of individual growers throughout the region, the total crop, field run, from acreage that passed final field inspection is estimated at 9,329,093 bushels. This compares with 3,657,556 bushels last year.

Latest reports show a total of 28,716 acres in 1924 that passed final field inspection compared with 12,763 in 1923. This is an acreage gain of 126 per cent. For the entire region the estimated average yield, field run, from acreage passed final field inspection was 325 bushels in 1924 compared with 287 in 1923. This is a gain in average yield of 13 per cent.

Maine, in 1924, with 51 per cent of the total acreage and Prince Edward Island with 29 per cent are the leaders. Maine had 57 per cent of the total crop in 1924, while the Island had 25 per cent. Maine's crop in 1924 was 45 per cent larger than the crop of the entire region in 1923. Other important details appear in the table below.

CERTIFIED SEED POTATOES 1923 AND 1924
ACREAGE PASSING FINAL FIELD INSPECTION AND
PRODUCTION

Varieties		Irish Cobbler	Green Mountain	Spaulding Rose	Others	Total
Maine						
1923	Acreage	1,987	3,644	585	12	6,228
1923	Production	635,840	1,279,044	187,200	3,720	2,105,064
1924	Acreage	5,400	6,031	3,081	176	14,699
1924	Production	1,893,850	2,261,625	1,078,350	59,840	5,291,640
New Hampshire						
1923	Acreage		47			47
1923	Production		15,040			15,040
1924	Acreage		104			104
1924	Production		31,720			31,720
Vermont						
1923	Acreage	76	406		6	488
1923	Production	18,392	111,650		1,650	131,760
1924	Acreage	158	487		6	651
1924	Production	39,500	141,230		1,740	182,280
New York						
1923	Acreage	93	560	23	536	1,212
1923	Production	19,530	132,720	5,980	93,800	252,096
1924	Acreage	153	813	4	469	1,439
1924	Production	36,720	220,323	720	117,250	375,579
New Brunswick						
1923	Acreage	765	1,375	37	11	2,188
1923	Production	187,425	385,000	9,065	3,080	584,196
1924	Acreage	1,794	1,605	10	58	3,467
1924	Production	504,114	552,120	2,850	16,008	1,074,770
Prince Edward Island						
1923	Acreage	1,600	1,000			2,600
1923	Production	320,000	250,000			569,400
1924	Acreage	5,693	2,646	17		8,356
1924	Production	1,565,575	793,800	4,675		2,373,104
TOTALS						
1923	Acreage	4,521	7,032	645	565	12,763
1923	Production	1,181,187	2,173,454	202,245	102,250	3,657,556
1924	Acreage	13,209	11,686	3,112	709	28,716
1924	Production	4,039,759	4,000,818	1,086,595	194,838	9,329,093

Acreage above is as reported by inspection officials; production is based on official reports, analysis of conditions, comparison with table potato yields and reports from many growers of their actual yields. The figures for New York state include: The Northern New York Independent Seed Potato Growers' Association and The New York Seed Improvement Cooperative Association totals but not those of the Granby Association which sent no report.

As regards yields per acre, certified seed, at least for 1923 and 1924, appears to have a marked stabilizing effect in Maine as contrasted with uncertified seed. Thus the yield from uncertified seed was 24 per cent larger in 1924 than in 1923 while certified seed showed a gain of only 7 per cent.

From another angle in years when uncertified seed turns out much lower yields, certified seed holds up near the yield which it gives in years when uncertified seed runs up a high yield. General use of certified seed on an acreage balanced with the country's consumptive needs might do much to solve the hardest problems that trouble growers.

**CERTIFIED SEED POTATOES: PER CENT OF ACREAGE
ENTERED THAT PASSED FINAL FIELD INSPEC-
TION; YIELD PER ACRE: ESTIMATED PER
CENT OF PRODUCTION, FIELD RUN,
ELEGIBLE FOR CERTIFICATION**

STATE OR PROVINCE	% of Acreage Entered pass- ing Fin. Insp.		Yield per A. Bushels		Estimated amount eligible for cert.			
	1923	1924	1923	1924	Bus.	%	Bus.	%
Maine	49	60	338	360	1,642*	78	4,022*	76
N. H.	85	97	320	305	11	72	23	71
Vermont	75	92	270	280	94	71	131	72
New York	73	83	208	261	197	78	300	80
New Bruns.	61	55	267	310	421	72	752	70
P. E. I.	83	94	219	284	376	66	1,590	67
TOTAL	58	68	287	325	2,739	75	6,818	73

* In these columns ,000 have been omitted.

HANDLING THE SURPLUS CROP

J. W. Weston, Extension Specialist, East Lansing, Mich.

The problems of production and marketing are inseparable. Market requirements demand standardization. Standardization must be a collective effort along the lines of adaptation of variety to soil and climatic conditions and conforming to the consumers demands. Success will come when the individuals of a community realize what the market wants and can supply the need in the most efficient manner.

The potato improvement program in effect over the United States is responsible in some degree for some of the increase in the average yield of potatoes per acre and also the greater percentage of marketable potatoes.

Total crop production reports determine the price level of consumable potatoes.

Two methods to increase the utilization of surplus potatoes are available,—1st by increasing the per capita consumption and 2nd by using the potatoes as a livestock food in the surplus producing areas as a substitute for other feeds when the price of table stock

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potatoes makes it more profitable to feed the potatoes than to sell them. One-fourth the delivered price of a bushel of shelled corn would establish the worth of a bushel of potatoes as an equivalent feed or their relative exchange value.

Advertisizing is a mode of education by which the knowledge of consumable goods is increased and a greater demand created.

Education to secure greater utilization of cull and surplus potatoes on the farm as livestock feed and direct advertising to the consuming public especially by the Health appeal of the value of potatoes as a food especially for growing children, would increase our per capita consumption of potatoes. But these plans have possibilities, but they need concerted action on the part of the producer to secure them. Cooperation in production and marketing is necessary. This cooperative plan must include in its program a plan for taking care of its surplus potatoes. This apparently will apply principally to the 19 late producing states and more especially to those at the greater distance from the consuming markets.

Michigan growers in the surplus producing area where the grain part of the corn crop was more or less of a failure, have been realizing near 35 cents a bushel for their potatoes as a substitute for corn if they had to buy it. They have realized only 22-25 cents a bushel for their potatoes after hauling them to the loading stations to be sold for table stock purposes.

SWAT THE CULL POTATO

George L. Zundel — Extension Plant Pathologist
Extension Service-State College

An agricultural product is worth no more than the poorest product in a container. If then, a large number of cull potatoes are sold, it naturally cuts down the price. The American consumer is demanding today a high grade potato and, Mr. Producer, these culls have no business to leave your farm. They are too expensive to market, and they give you a bad reputation. Besides, you can use your culls to very good advantage on your farm to feed your animals.

Mr. Consumer, when you are buying potatoes, demand the highest grade. Do you know that it takes about 25 per cent more time to peel an irregular potato than it does to peel and prepare for cooking a potato that is smooth and well graded. Besides that the irregular potatoes and culls have from 10 to 15 per cent more waste. These figures have been known to the Extension Service for a long time but we did not know definitely, until recently, what per cent of culls were being sold in some of our local markets.

Consequently, during November, window displays were exhibited in various grocery stores in Stevens, King, and Pierce Counties. This work was carried on cooperatively by the Extension Specialist in Horticulture, the Extension Specialist in Plant Pathology, and the various county agents. Our plan was to go to local stores and arrange to use a portion of their windows for display work. We then secured potatoes from this grocer as they had been delivered to him by the farmers and proceeded to grade them. We found then, that culls ranged all the way from 52 per cent to as low as 3 per cent. In all there was over two tons of potatoes graded. In one county we found that there was an average of 48 per cent U. S. No. 1, 41 per cent U. S. No. 2, and 11 per cent culls. In another county there was 41 per cent U. S. No. 1, 44 per cent U. S. No. 2, and 15 per cent culls. In the third county there was 26 per cent U. S. No. 1, 52 per cent U. S. No. 2 and 22 per cent culls.

In talking with the local merchants, a number of questions were asked them. The first question was, "Do you buy local potatoes, and what proportion?" The answer ranged variously. Some of the merchants said that they wanted to use local potatoes but they could not depend upon the grading and for that reason they were not using any local potatoes but were importing graded potatoes from irrigated sections. About half the grocers said that they used all that they possibly could dispose of, but that poor grading and

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too many varieties limited the market for local potatoes compared with the potatoes from irrigated sections. In most cases they said that they found that the local potatoes were as good, when grown on proper soil, as any that they could import. We then inquired whether or not the farmers would buy local potatoes if they were properly graded and in every case the grocers said that they would because in doing so they would help to build up their own community and in that way help themselves to get a bigger business. We found one local groceryman on the west side who paid \$3.00 more a ton for local spuds than what he had to pay for graded Yakima Netted Gems. He was doing this to encourage the farmers to grade.

A number of things must be remembered in the figures given here. You will note that there is an average of about 14 per cent culls. That does not tell the entire story of how some potatoes are sold in the state since the groceryman in most cases had selected one or two farmers in his own community who were grading fairly well. In one instance we found that the farmer had delivered some potatoes to a groceryman which graded out 60 per cent culls. This is an extreme case. I believe that if we would be able to get potatoes sold to grocers by men who grade fairly close and those who did not grade at all we would find that about 25 per cent of the potatoes sold on the market would be culls. This,

of course, cuts down consumption and lowers the price of the product paid to the farmers.

Then again, there are producers who have not yet learned what is meant by U. S. Number 1, U. S. Number 2, and culls, so that it will call for education. In summing up the reasons for culls and the amount of culls we found that there are four main causes. First, rough handling. In some cases we found that the farmers had not handled their potatoes very carefully and that in the process of digging, or harvesting, a good many of them were cut by the fork being stuck through them. Such a potato is not fit to be sold to any housewife. Small potatoes, irregular potatoes and disease, were the other three points. Small potatoes are caused by a number of factors, first, and foremost, I believe, is caused by diseased seed and the farmer who does not properly try to combat disease is going to have a large percentage of small potatoes.

There were a good many small potatoes in some of our dry land sections this year, due to dry weather. Irregular potatoes are caused by not having the ground prepared properly, by use of diseased seed, and improper cultural conditions.

Potatoes with a large amount of scab or rot should never be harvested. In one state we found that in 100 pounds of potatoes there was about 15 pounds of potatoes so rotten that we could hardly pick them up to sort them out. This was due to rough handling in the field. In order then, to produce a better quality of market potatoes, farmers should, first, get potatoes that are disease free and the only safe way to do this is to get a certified product, or get seed from men who rogue their fields. They must then select proper soil and plant at the proper time. We have found that farmers who use high grade seed increase their yields per acre on an average of about 48 to 60 per cent, and get a better marketable potato.

There is no reason why people in Stevens County and the counties west of the Cascades cannot produce as high grade a potato as is produced in any part of the state, and if they will only take the pains they can build up a good market for their product. They must, however, properly grade their potatoes.

FIVE YEARS OF SEED IMPROVEMENT IN SPOKANE COUNTY, WASHINGTON

Geo. L. Zundel, Extension Plant Pathologist

According to the census of 1920, Spokane County ranks second in the production of potatoes in Washington with a total yield of about 674,207 bushel. Noting the importance of potatoes in that county, considerable extension work has been done the last five years to improve the potato crop.



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The first effort was in September, 1919, when a field roguing demonstration was held on the farm of Mr. George J. Cannon at Buckeye. Following that, small potato organizations were formed throughout the county.

When the work was first started in Spokane County, emphasis was placed upon the control of fungus diseases, especially the Rhizoctonia, and for three years demonstrations on the treatment of seed were held throughout the county. At the present time, this work has so spread that I do not know of a bona fied potato grower that does not properly treat his seed. Much of the success of this can be attributed directly to the untiring work of County Agent O. V. Patton. Three years ago we had somewhat of a setback in our potato improvement campaign in Spokane County when it was discovered that various "running out" diseases were prevalent in our potato fields. We were at a loss to know what to do, since a survey of the state and the nation revealed the fact that other places were in as bad condition as Spokane County.

For two years then, we were hunting for strains of potatoes that did not have a very high per cent of these diseases and at the present time we have a number of strains of Netted Gem seed in Washington that are practically free from running out diseases. Last spring through the county agent's office, 158 sacks of high

grade certified seed was imported into Spokane County and distributed to about 71 farmers in 23 communities. The results in general have been very gratifying, and show that it pays to use practically disease free seed.

A survey recently made by County Agent Patton shows that of 20 reports received, certified seed yielded from 30 to 107 sacks per acre with an average yield of 73.6 sacks. Thirteen reported yields from other seed not certified, of from 8 to 85 sacks per acre with an average yield of 50 sacks per acre. Thirteen reported an average yield of 73.1 sacks per acre from certified seed, or an increase of 48 per cent by using certified seed. Of the 13 tests, 8 men reported better yields from the certified seed, 3 men reported equal yields with uncertified seed, and only 2 men reported good yields from uncertified seed. Eight men using 57 sacks of certified seed increased their yields from 16 per cent to 1,200 per cent, with an average of 48 per cent. When we consider that some of the men got equal yields with uncertified seed, we can see that there are some strains of uncertified that are high yielding. We are glad to know where these strains are so that the seed can be distributed among the farmers of the state. One man got poor results from using certified seed mainly because his ground was infected with fungi that caused disease.

NOTES ON POTATO INSECTS IN VERMONT

Harold L. Bailey, Bradford, Vt.

Among the semi-centennials that we do not care to celebrate is that of the coming of the Colorado potato beetle to Vermont. It falls due this year, according to the horticultural records of the state, for in his report of 1875, Dr. Perkins, the zoologist, says:

"I had specimens sent me last summer from the western border of the state, and it probably occurs in the southern border."

Albeit, the control of the beetle has come to be an easy matter, amounting to no more than the cost of the arsenical itself, to those that spray or dust properly for blight, it still unquestionably is the most destructive potato insect in the state if left to its own devices. Few, if any, other species of insect, native or imported, have shown the persistency and regularity in thriving yearly reproductions that this insect has exhibited. While there are occasional years when the beetles seem to be less plentiful than usual, the variation is by no means as marked as in the case of most insect pests.

Second to this species in point of direct damage to the plants is the potato, or cucumber, flea beetle. Whether it is that this species has become more plentiful than was formerly the case in potato fields, or that greater specialization in potato growing has brought down more attention upon the species, it has come much into prominence within a very few years. In Vermont the injury by the flea

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beetle has been caused very largely by the adults. In some cases they have been very active accessories to, if not the cause of, the complete dying down of fields, especially of Irish Cobbles. In several cases this season what appeared to be the work of larvae on the tubers was reported. In comparing reports from those who dust and those who spray, the "drys" seem to have it, so far as the control of this insect is concerned.

Doubtless, the leafhopper has not yet attained to its full standing in the state, although scattering hoppers are to be found in most fields. In a few instances, cases of real damage to the foliage by this insect have been noted.

Occasionally, in combination with dry weather, poor culture, flea beetle attack or other adverse conditions, aphids act as a factor in the breaking down of a field. It is not often, however, and usually their work, if visible at all, consists of very small brown patches in the leaves. Its importance as a disease carrier is, of course, another matter, and is quite familiar to all growers of certified seed.

In at least one instance very serious damage has arisen from the work of a large flea beetle, three or four times the size of the potato flea beetle, but only a very few scattering individuals of the species have been located elsewhere. It is scientifically known as *Systema frontalis* Fabr.

The various species of blister beetles, which have been reported in some places as rather important potato insects, are so rare here that it has been difficult to secure specimens for exhibition purposes, and the work by the three-lined plant bug is practically nil. While cut-worms may be responsible for a few missing hills, it is very seldom indeed that their work can be identified as such, and the same is true of the stalk borers. The withered tips of new growth, caused by the sucking of the tarnished plant bug, has led to many inquiries on the part of the careful growers, results in little damage, as a rule to the potatoes.

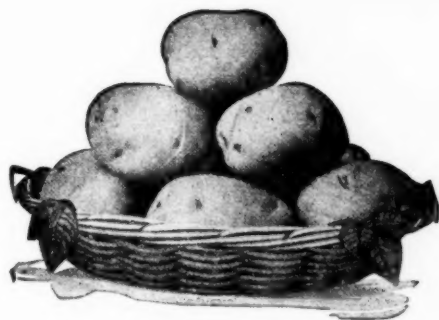
One other insect generally named in the roster of potato plant enemies, the four-lined plant bug—though occasionally found in our fields, would scarcely be worth notice were it not for the claims recently set forth to the effect that capsid bugs are, like aphids and perhaps leafhoppers, carriers of mosaic and leafroll. Our four-lined leaf bug (*Poecilocapsus lineatus* Fabr.) is a capsid bug, and though a different species from that specified by Murphy in his experiments along this line, it would presumably have the same proclivities in the way of disease transmission.

Since currant bushes are named as the principal depository of the eggs of this insect, certified seed potato growers may, with the growers of white pine, have to take into consideration the proximity of that fruit to their growing crops.

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